

Overview and Identification

The Immersion Sensor is made for thermowell mounting and temperature measurement in water pipes, water tanks or cooling tower sump applications. The rigid probe is made of Stainless Steel and made in different lengths for a custom thermowell fit. The unit is available with multiple thermistor's or RTD's as shown in the specifications. Enclosure mounting styles come in plastic or metal for both NEMA 1 and NEMA 4 applications and are all plenum rated.

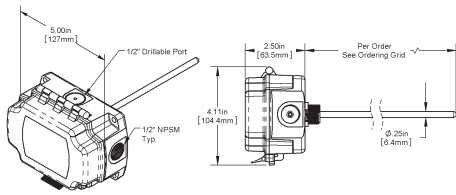


Fig 1: BAPI-Box (BB) Immersion

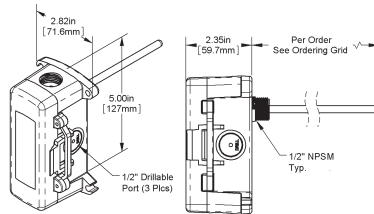


Fig 2: BAPI-Box 2 (BB2) Immersion

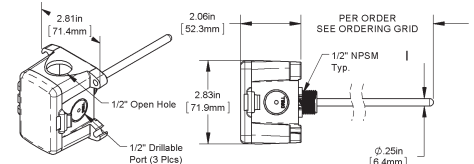


Fig 3: BAPI-Box 4 (BB4) Immersion
(A Pierceable Knockout Plug is available from BAPI for the open port in the BB4. Part #BA/ PKP-100)

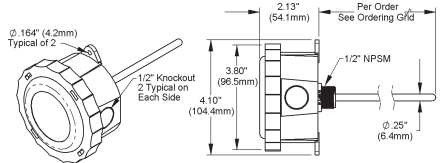


Fig 4: Weather Tight (EU) Immersion

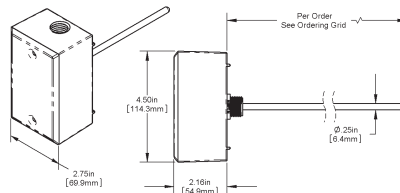


Fig 5: Weatherproof (WP) Immersion

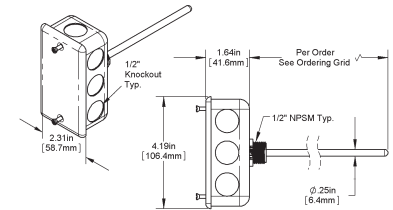


Fig 6: J-Box Immersion (Standard)

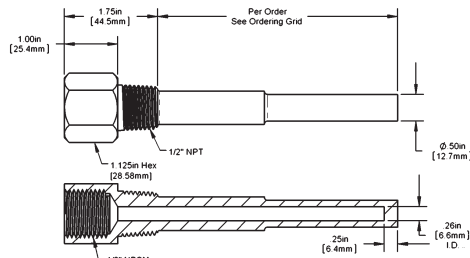


Fig 7: Machined Bar Stock ThermoWell

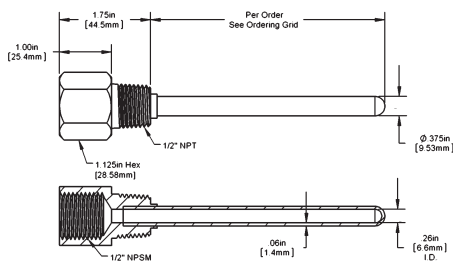


Fig 8: Two Part Welded Well

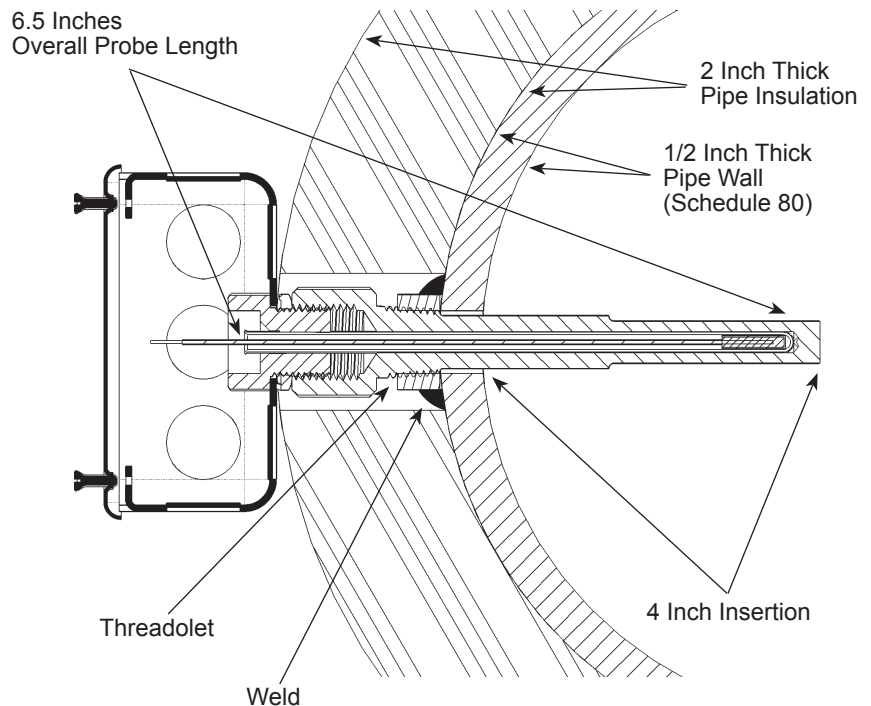


Fig 9: Typical Installation Identification and Dimensions

Specifications subject to change without notice.

Mounting

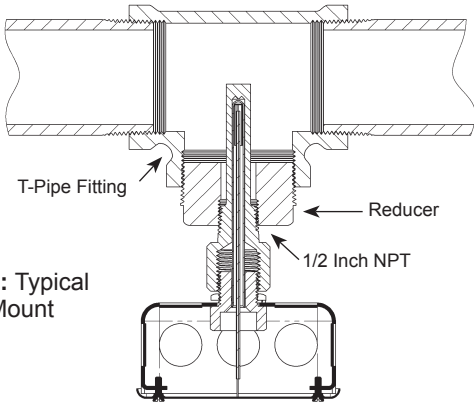


Fig 10: Typical T-Mount

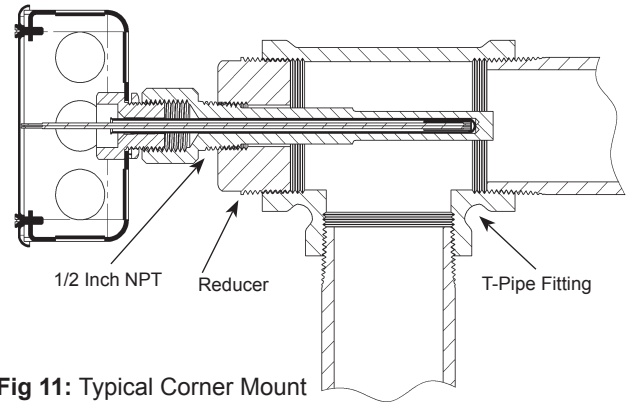


Fig 11: Typical Corner Mount

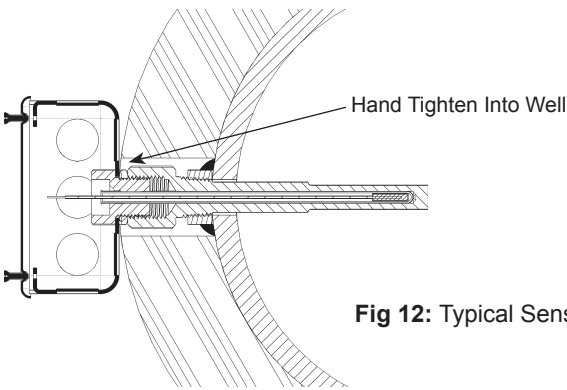


Fig 12: Typical Sensor Inserted

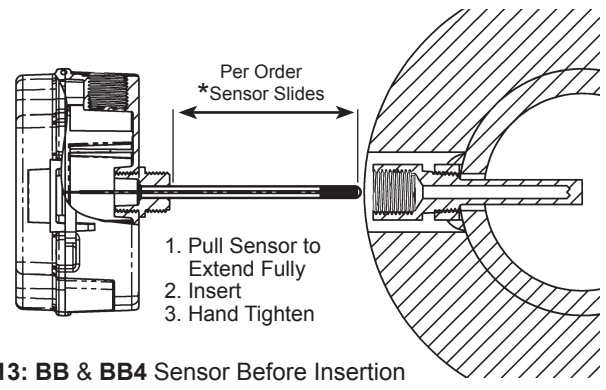


Fig 13: BB & BB4 Sensor Before Insertion

Fig 14: BB2 Sensor Before Insertion

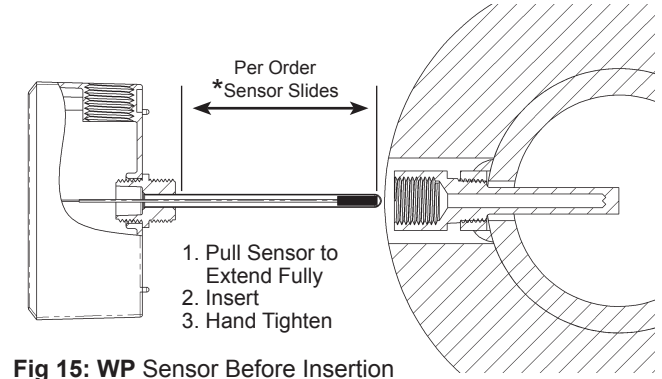
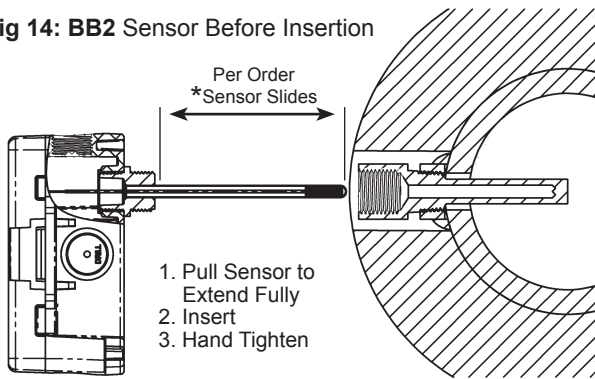


Fig 15: WP Sensor Before Insertion

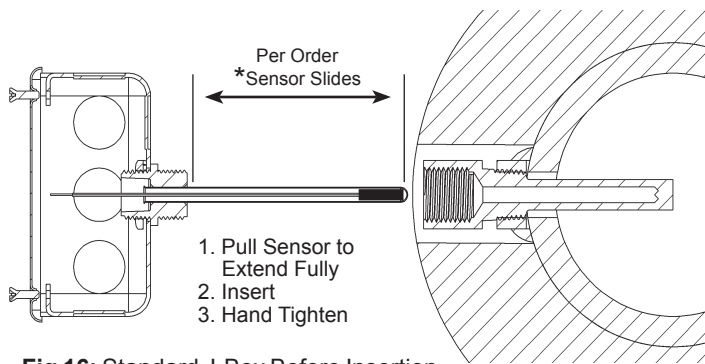


Fig 16: Standard J-Box Before Insertion

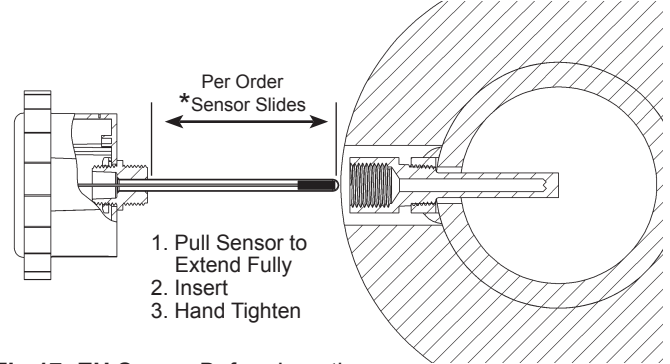


Fig 17: EU Sensor Before Insertion

*As the box is hand screwed, the probe will push into the box as the probe tip bottoms out in the well. The probe can slide up to 1.6 inches.

Specifications subject to change without notice.

Mounting continued...

- Application:** Figure 9 shows a typical four-inch thermowell and four-inch immersion probe installed into an eight inch pipe. In a properly insulated pipe with liquid or steam, the temperature is essentially the same across the entire cross section of the pipe. Usually thermowells are sized to extend to the center of the pipe; however, shorter thermowells will give proper temperature readings if properly insulated. The shorter thermowells are used in pipes with high flow velocities. See Application notes "Thermowells Explained" on our web site BAPIHVAC.com
- Thermowell Installer:** Typically a Pipe Fitter drills a 3/4-inch hole into the pipe where the thermowell is needed. A customer provided fitting, called a Threadolet or Weldolet, is welded to the pipe over the hole. The Threadolet has a 1/2" NPT thread in the center. Thread sealant such as Teflon tape or pipe dope is applied to the 1/2" NPT threads of the thermowell. The thermowell is then inserted into the Threadolet and tightened. Estimates on insertion depths can be seen in our Application note "Thermowells Explained" on our web site BAPIHVAC.com
- Sensor Installation:** Insert the immersion sensor into the well with the plastic screw fitting into the opening on the well. Hand tighten the immersion sensor snugly without too much torque. Make sure that the tip of the immersion sensor is in contact with the bottom of the well by pushing on the top of the probe, without damaging the wires, to bottom out the probe in the thermowell. The unit is designed so that the temperature probe slides in the junction box as the sensor hits the bottom of the well.

Wiring & Termination

BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as high or low voltage AC power wiring.

BAPI's tests show that inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires.

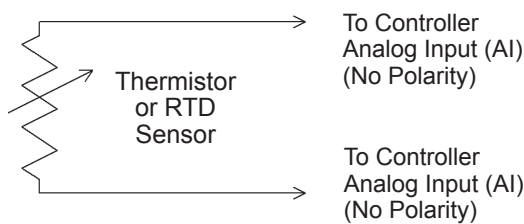


Fig. 18: 2 Wire Lead Wire Termination for Thermistor or RTD

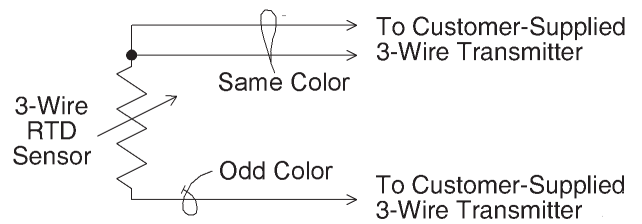


Fig. 19: 3 Wire Lead Wire Termination for RTD

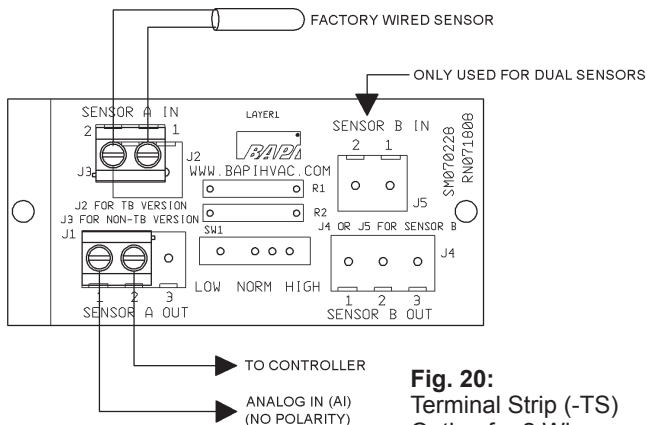


Fig. 20: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

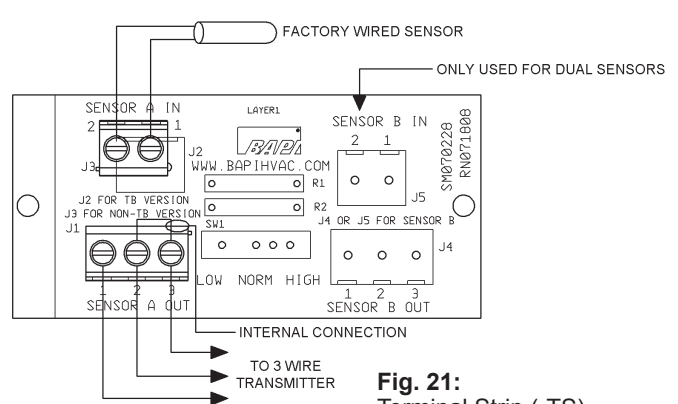


Fig. 21: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

Specifications subject to change without notice.



Diagnosics

Problems:

Controller reports higher or lower than actual temperature.

Possible Solutions:

- Confirm the input is set up correctly in the front end software
- Check wiring for proper termination & continuity. (shorted or open)
- Disconnect wires and measure sensor resistance and verify the "Sensor" output is correct.

Specifications

Sensor:	Passive
Thermistor,	2 wire
RTD,	2 or 3 wire
Thermistor	Thermal resistor (NTC)
Temp. Output	Resistance Per Order 1
Accuracy	(std) $\pm 0.36^{\circ}\text{F}$, ($\pm 0.2^{\circ}\text{C}$)
Accuracy	(Hi) $\pm 0.18^{\circ}\text{F}$, ($\pm 0.1^{\circ}\text{C}$), [XP] option
Stability	0.036 $^{\circ}\text{F}/\text{Year}$, ($< 0.02^{\circ}\text{C}/\text{Year}$)
Heat dissipation	2.7 mW/ $^{\circ}\text{C}$
Temp. Drift	$< 0.02^{\circ}\text{C}$ per year
Probe range	-40° to 221°F (-40° to 105°C)
RTD	Resistance Temp Device (PTC)
Platinum (Pt)	100 Ω and 1K Ω @ 0°C , 385 curve
Platinum (Pt)	1K Ω @ 0°C , 375 curve
Pt Accuracy (Std)	0.12% @Ref, or $\pm 0.55^{\circ}\text{F}$, ($\pm 0.3^{\circ}\text{C}$)
Pt Accuracy (Hi)	0.06% @Ref, or $\pm 0.277^{\circ}\text{F}$, ($\pm 0.15^{\circ}\text{C}$), [A]option
Pt Stability	$\pm 0.25^{\circ}\text{F}$, ($\pm 0.14^{\circ}\text{C}$)
Pt Self Heating	0.4 $^{\circ}\text{C}/\text{mW}$ @ 0°C
Pt Probe range	-40° to 221°F , (-40 to 105°C)
Nickel (Ni)	1000 Ω @ 70°F , JCI curve
Ni Probe range	-40° to 221°F (-40 to 105°C)
Sensitivity	Approximate @ 32°F (0°C)
Thermistor	Non-linear – Go to bapivac.com click "Sensor Specs"
RTD (Pt)	3.85 $\Omega/^{\circ}\text{C}$ for 1K Ω RTD 0.385 $\Omega/^{\circ}\text{C}$ for 100 Ω RTD
Nickel (Ni)	2.95 $\Omega/^{\circ}\text{F}$ for the JCI RTD
Lead wire	22awg stranded
Insulation	Etched Teflon, Plenum rated
Probe	Rigid, 304 Stainless Steel, 0.25" OD
Probe Length	2", 4", 8" or custom per order

Mounting	$\frac{1}{2}$ " NPSM Plastic Threads
Enclosure Types	
J-Box	-JB , w/eight $\frac{1}{2}$ " knockouts
No Box	-NB , intended for open wiring
Weather Proof	-WP , w/ two $\frac{1}{2}$ " FNPT entries, (Bell box)
BAPI-Box	-BB , w/four $\frac{1}{2}$ " NPSM & one $\frac{1}{2}$ " drill-out
BAPI-Box 2	-BB2 , w/three $\frac{1}{2}$ " NPSM & three $\frac{1}{2}$ " drill-outs
BAPI-Box 4:	-BB4 , w/ three $\frac{1}{2}$ " drill-outs & one $\frac{1}{2}$ " open port
Weather Tight	-EU , -EUO , w/two $\frac{1}{2}$ " knockouts
Enclosure Ratings	
J-Box	-JB , NEMA 1
No Box	-NB , No rating
Weather Proof	-WP , NEMA 3R, IP14
BAPI-Box	-BB , NEMA 4X, IP66
BAPI-Box 2	-BB2 , NEMA 4X, IP66
BAPI-Box 4	-BB4 , IP10 (IP44 with Knockout Plug in the open port)
Weather Tight	-EU , NEMA 4X, IP66
Weather Tight	-EUO , NEMA 4X, IP66, UV rated
Enclosure Materials	
J-Box	-JB , Galvanized steel, UL94H-B
No Box	-NB , Nylon 66, UL94H-B
Weather Proof	-WP , Cast Aluminum, UV rated
BAPI-Box	-BB , Polycarbonate, UL94V-0, UV rated
BAPI-Box 2	-BB2 , Polycarbonate, UL94V-0, UV rated
BAPI-Box 4:	-BB4 , Polycarbonate & Nylon, UL94V-0
Weather Tight	-EU , ABS Plastic, UL94V-0
Weather Tight	-EUO , ABS Plastic, UL94V-0, UV rated
Ambient (Encl.)	0 to 100% RH, Non-condensing
All BAPI-Boxes	-BB , BB2 , BB4 , -40°F to 185°F , (-40° to 85°C)
Weather Tight	-EUO , EU , -40°F to 185°F , (-40° to 85°C)
J-Box & No Box	-JB , NB , -40°F to 212°F , (-40° to 100°C)
Weatherproof	-WP , -40°F to 212°F , (-40° to 100°C)
Agency	RoHS, *CE PT=DIN43760, IEC Pub 751-1983, JIS C1604-1989 *Passive Thermistors 20K Ω and smaller are CE compliant